Installing and Configuring DHCP Server

By: Omer

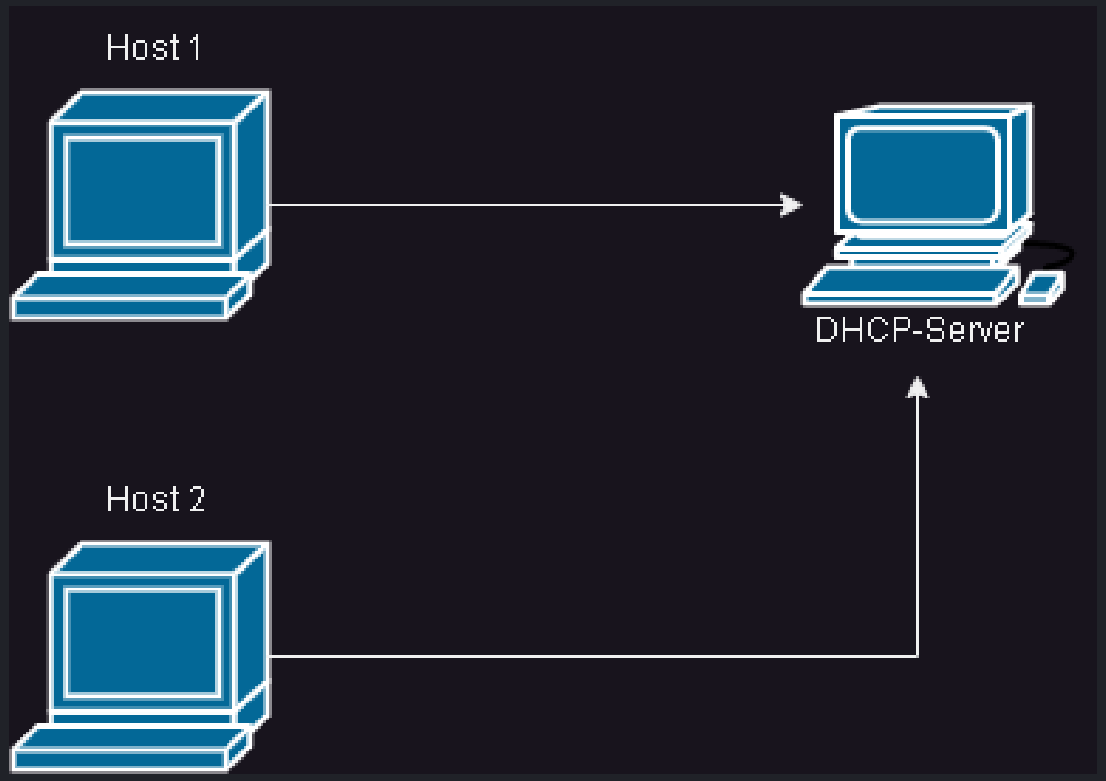
Scope Of Work

In this document we are going to simulate the installation / configuration and IP reservation of DHCP Server / Client

Following tools were used in this workshop

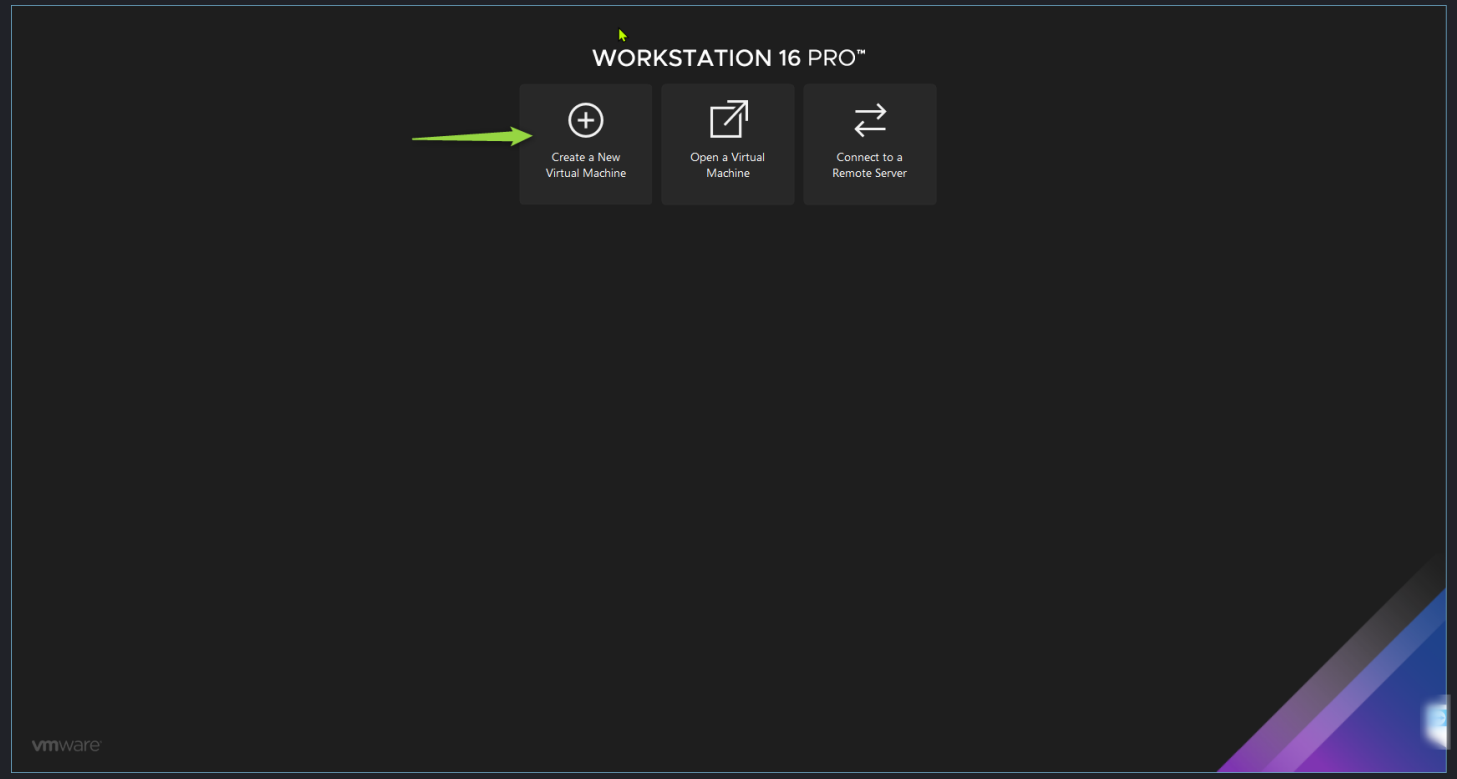
1. VMware Workstation (as hypervisor) on top of Windows 11.
2. Ubuntu Server (22.04) (DHCP Server)
3. Ubuntu Server (22.04) (Client server) Host1 and Host 2.

Diagram For DHCP Lab

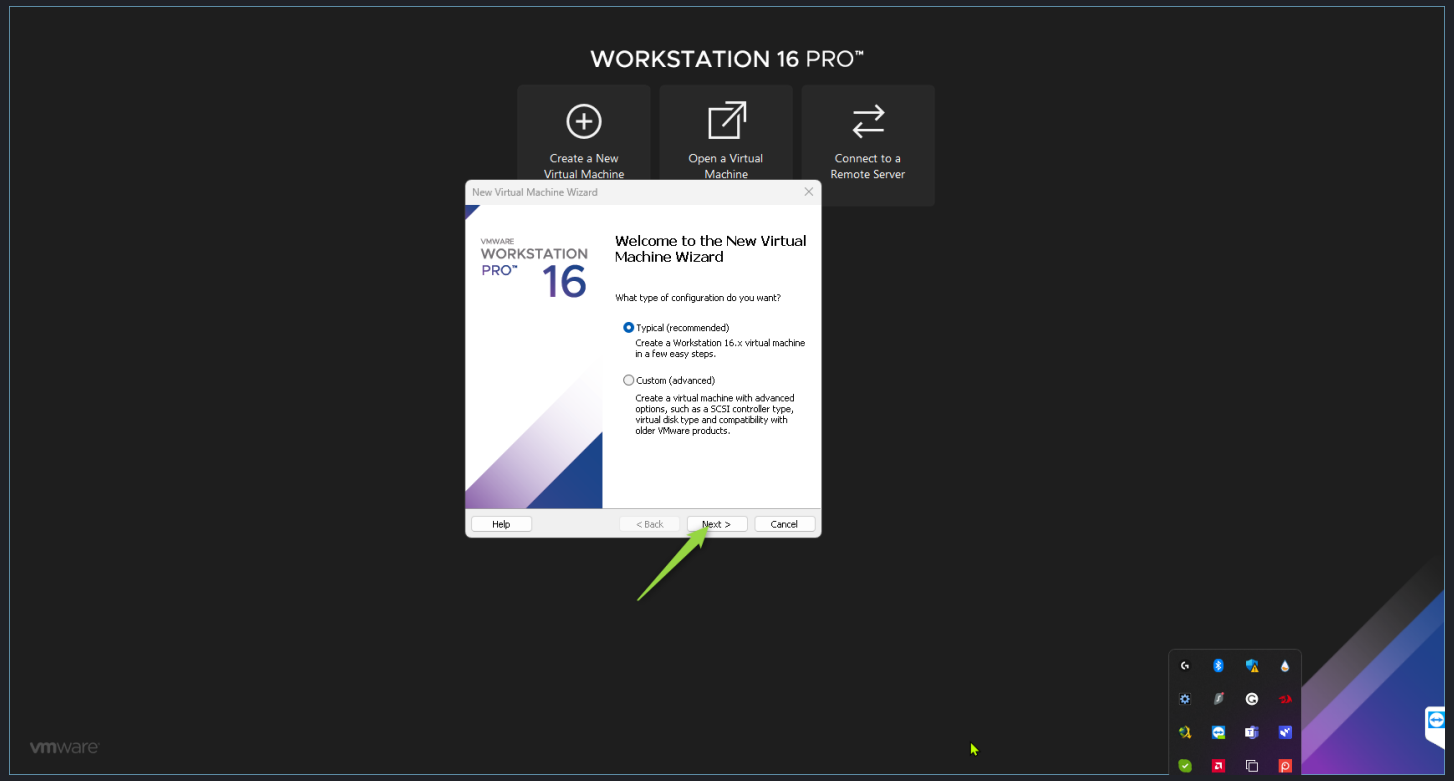


Creating VM of Ubuntu

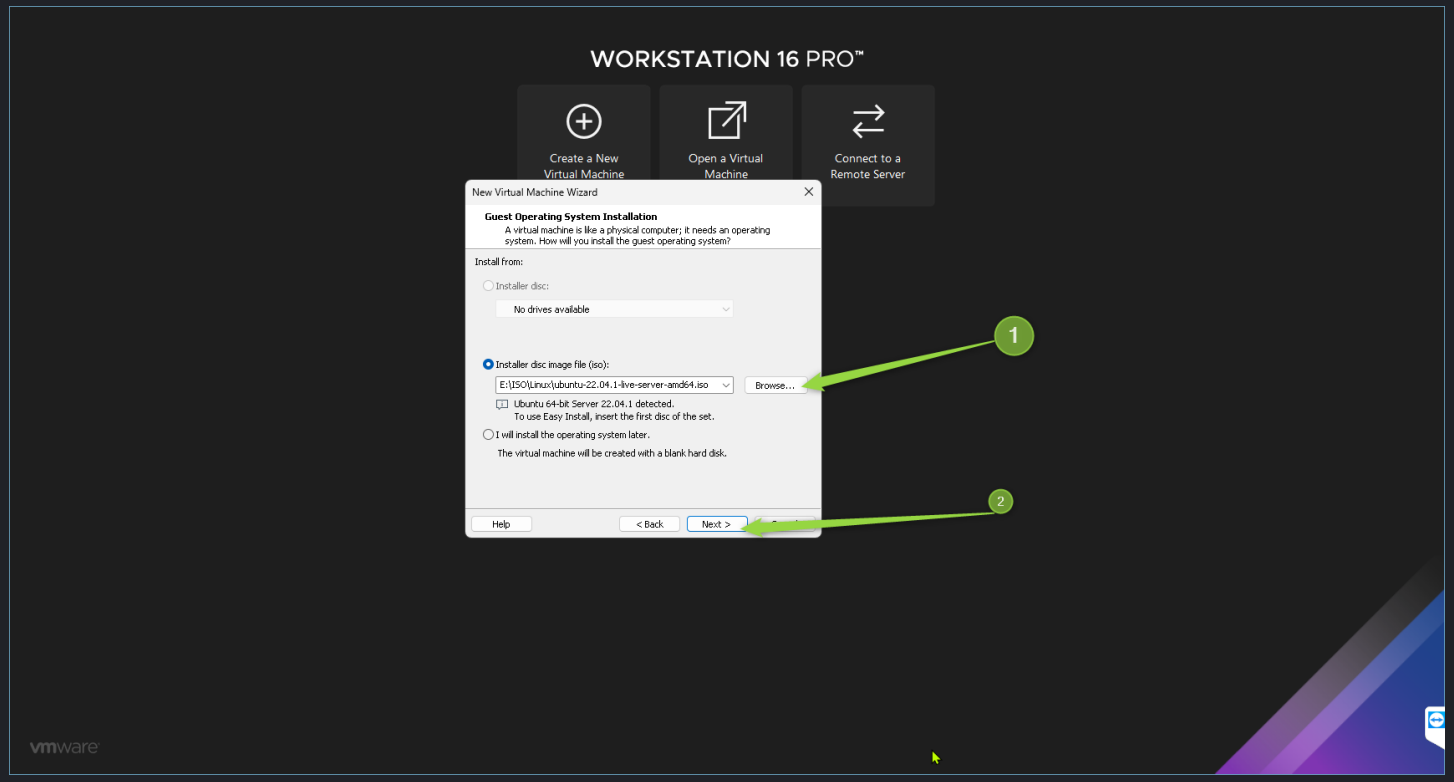
1. Select Create New Virtual Machine



2. Click On Next.

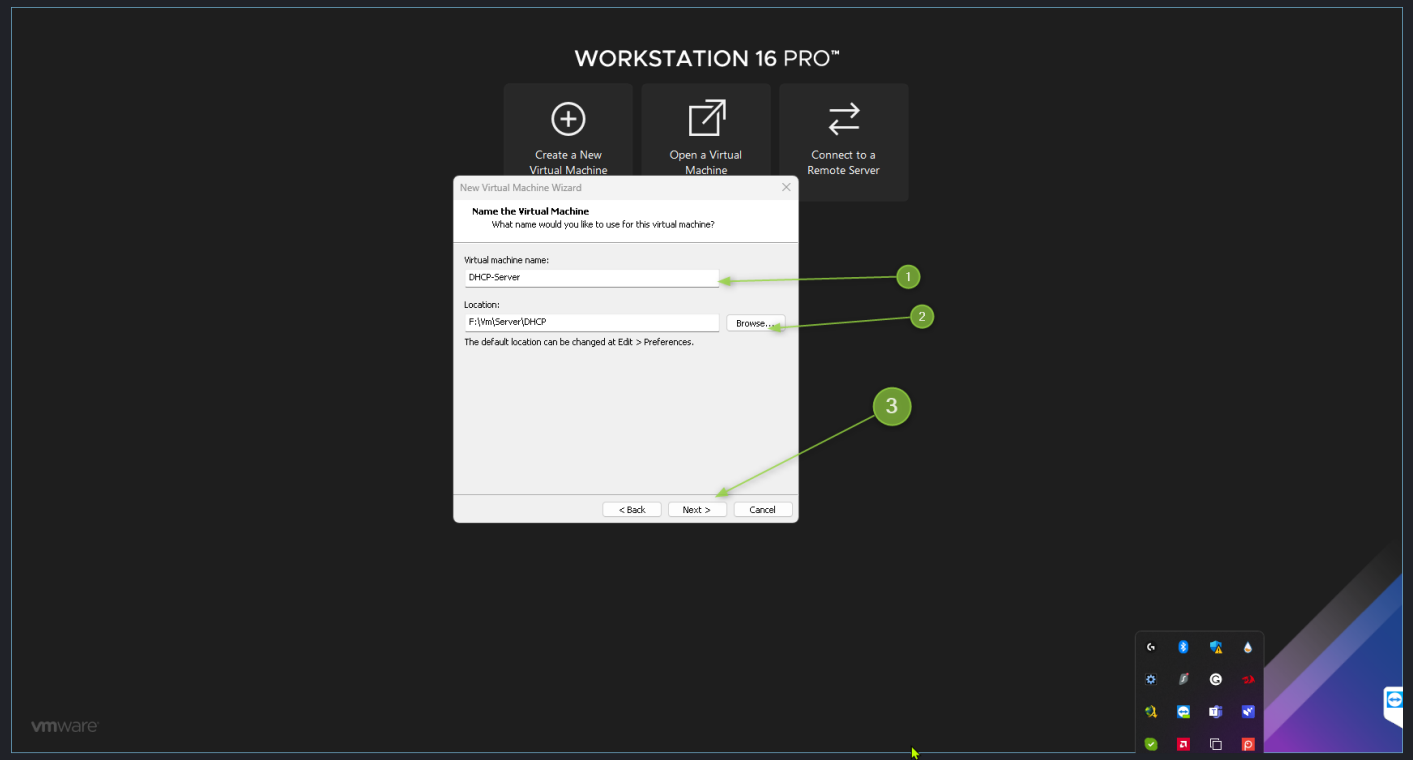


3. Selecting Image.



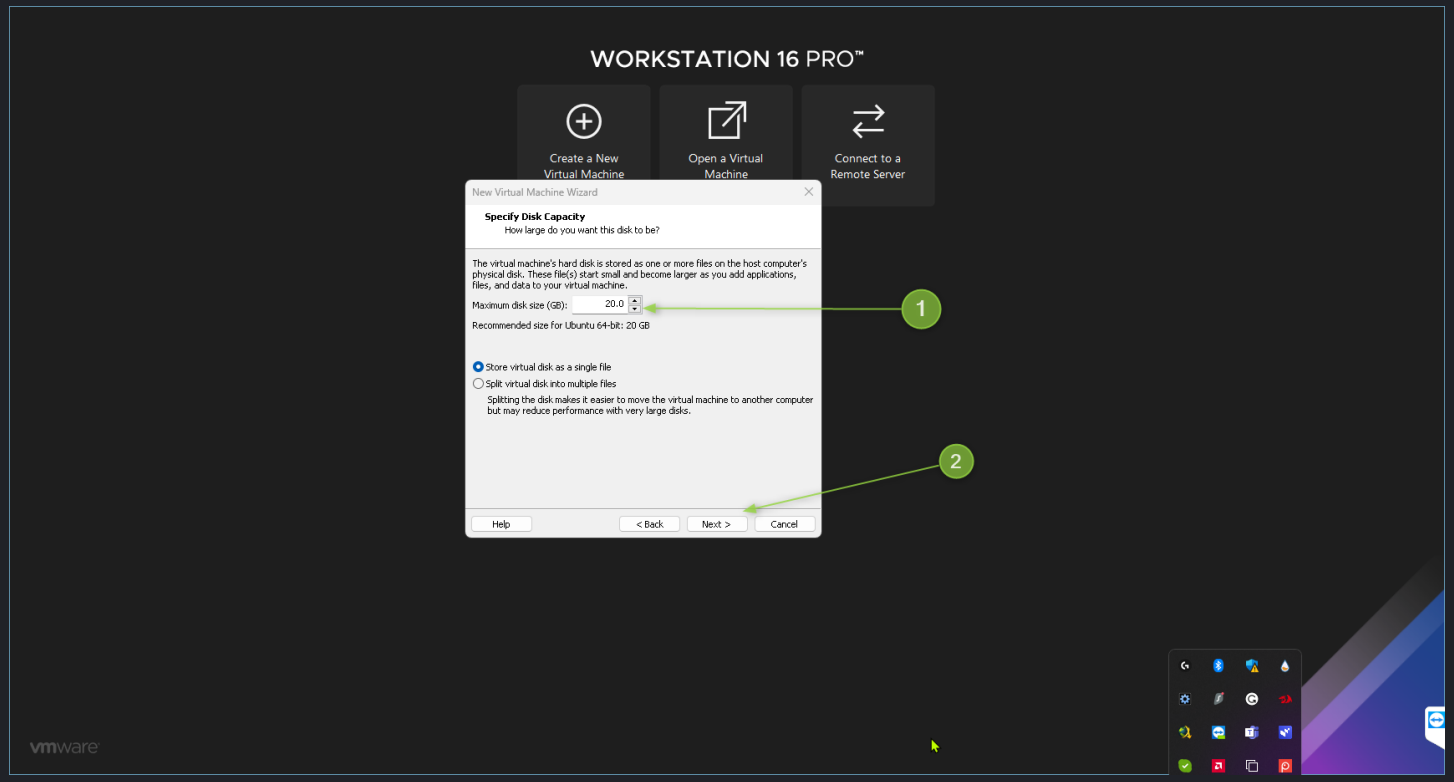
1. Browse Iso Image.
2. Click On Next.

4. Naming Server.



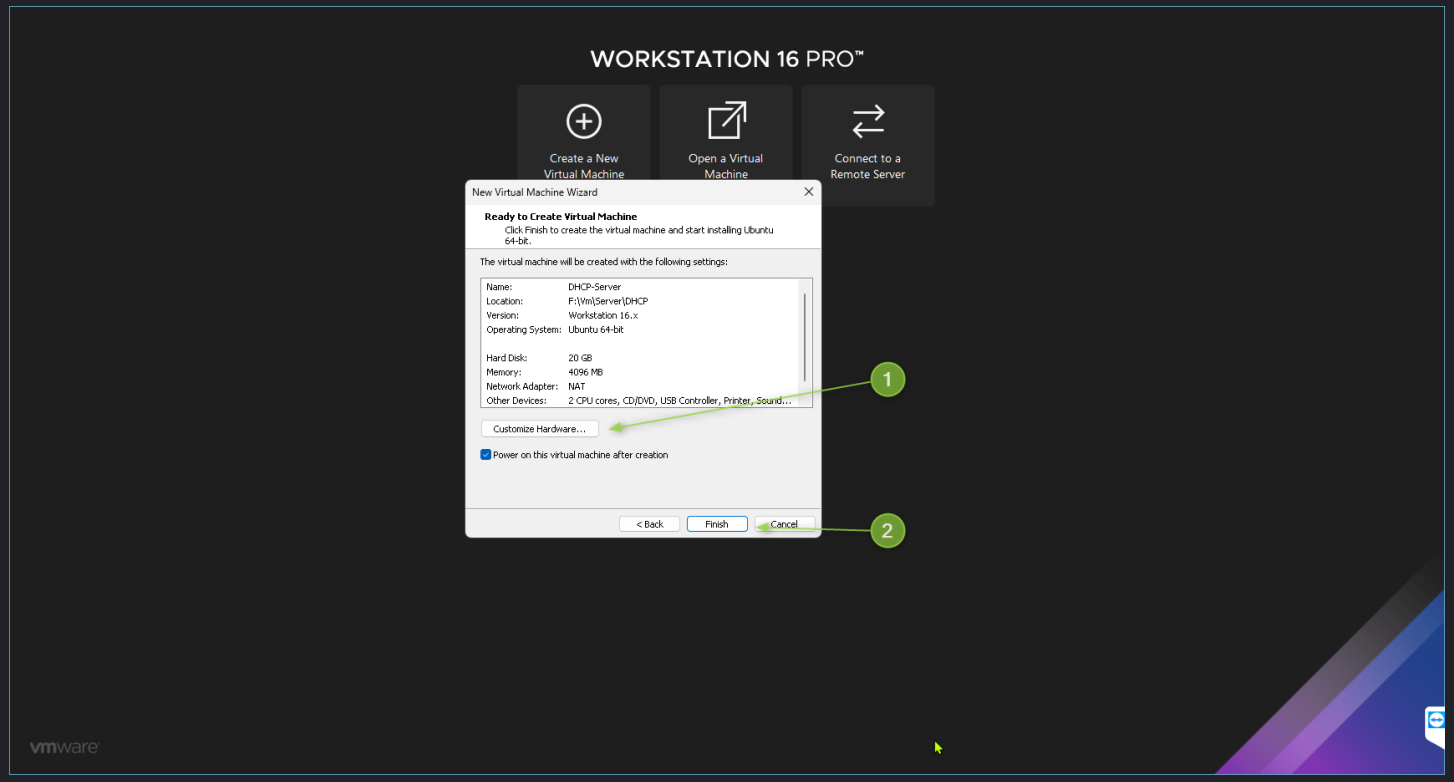
1. VM name.
2. VM location.
3. Click Next.

5. Storage Allocation.



1. Select Size.
2. Click Next.

6. Finish.



1. Customize Hardware(If Needed).
2. Click On Finish.

Install DHCP Server

You can install the DHCP Server using the apt command as follow

```
sudo apt install isc-dhcp-server
```

Backup Configuration File

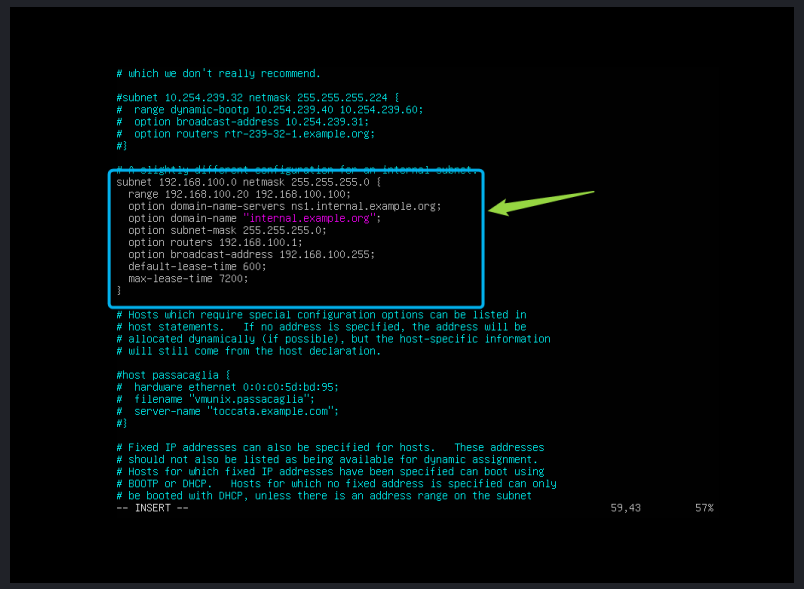
Backup Original Configuration file It’s always a good idea to backup original configuration files. In case if something goes wrong.

```
sudo cp /etc/dhcp/dhcpd.conf /etc/dhcp/dhcpd.conf.org
```

To Configure the DHPC Server

The main configuration file of DHCP server is /etc/dhcp/dhcpd.conf

```
sudo vim /etc/dhcp/dhcpd.conf
```



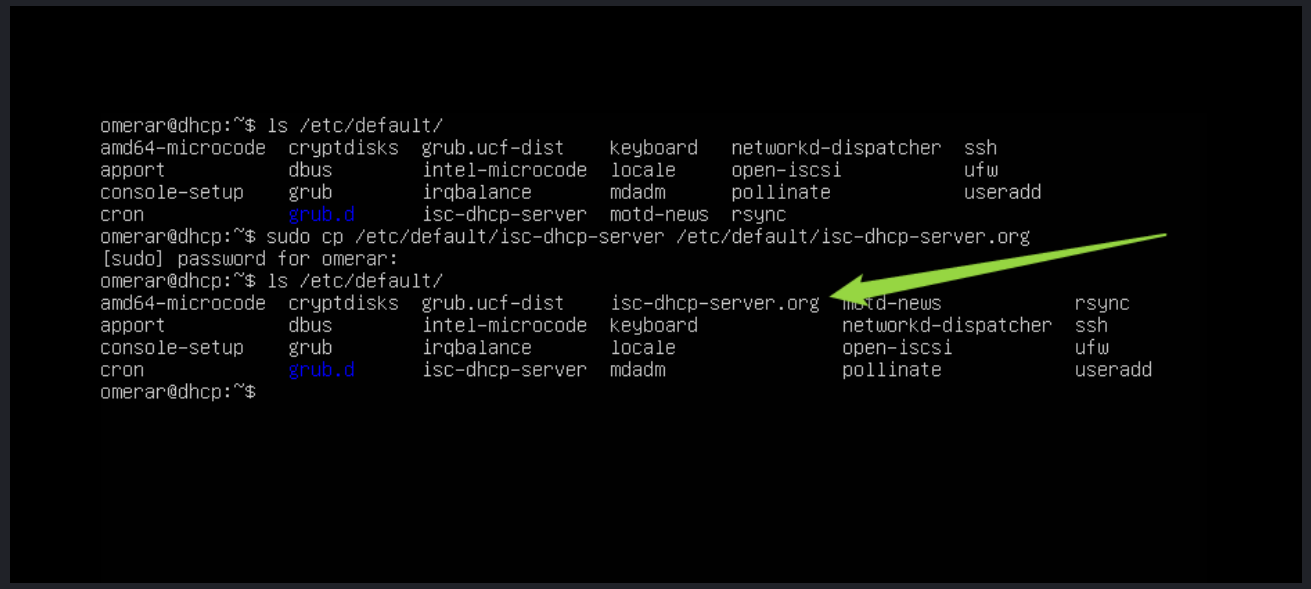
According To This Configuration

1. The default lease time for a client is 10 min(600 seconds)
2. The maximum lease time is 2 hrs(7200 seconds)
3. The Server will hand over the IP Address from the range 192.168.100.20 to 192.168.100.100

Backing Up

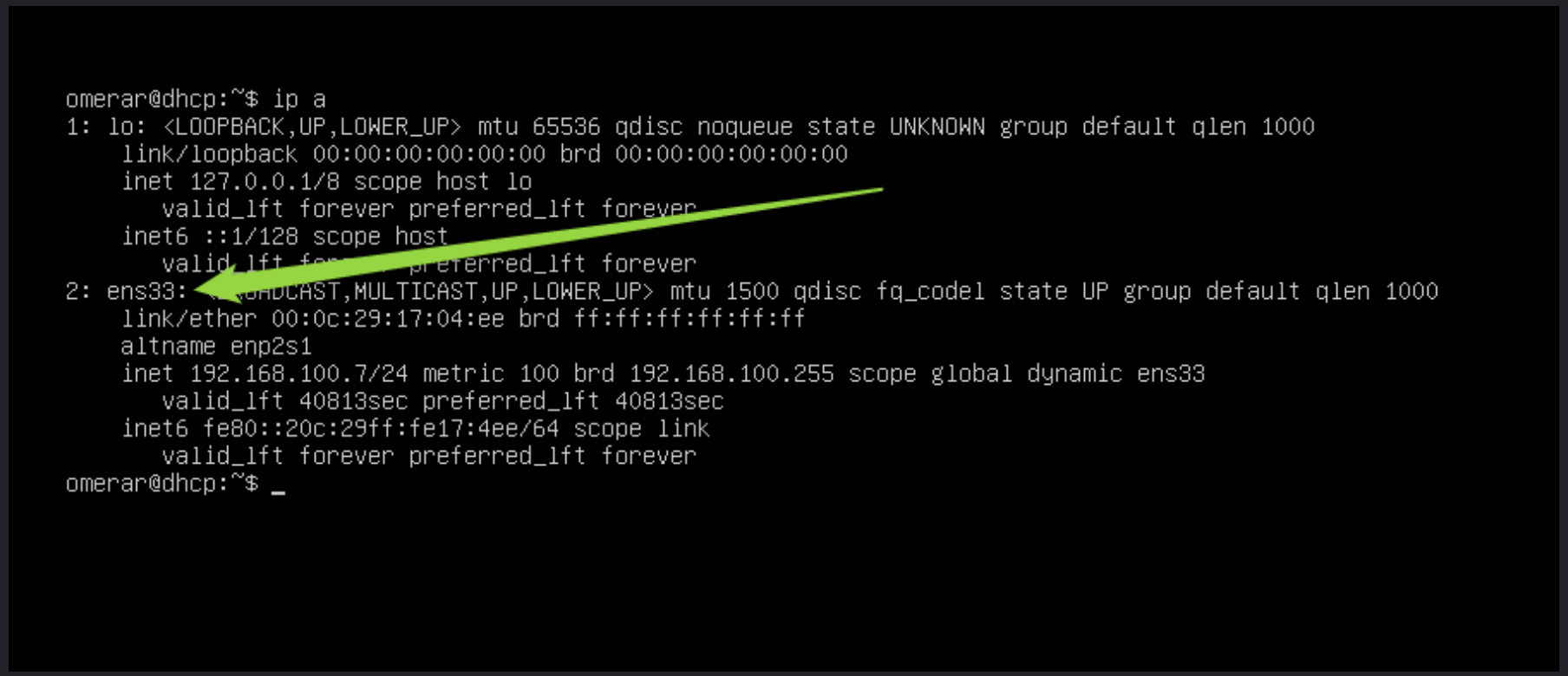
Backup Original Configuration file It’s always a good idea to backup original configuration files. In case if something goes wrong.

```
sudo cp /etc/default/isc-dhcp-server /etc/default/isc-dhcp-server.org
```



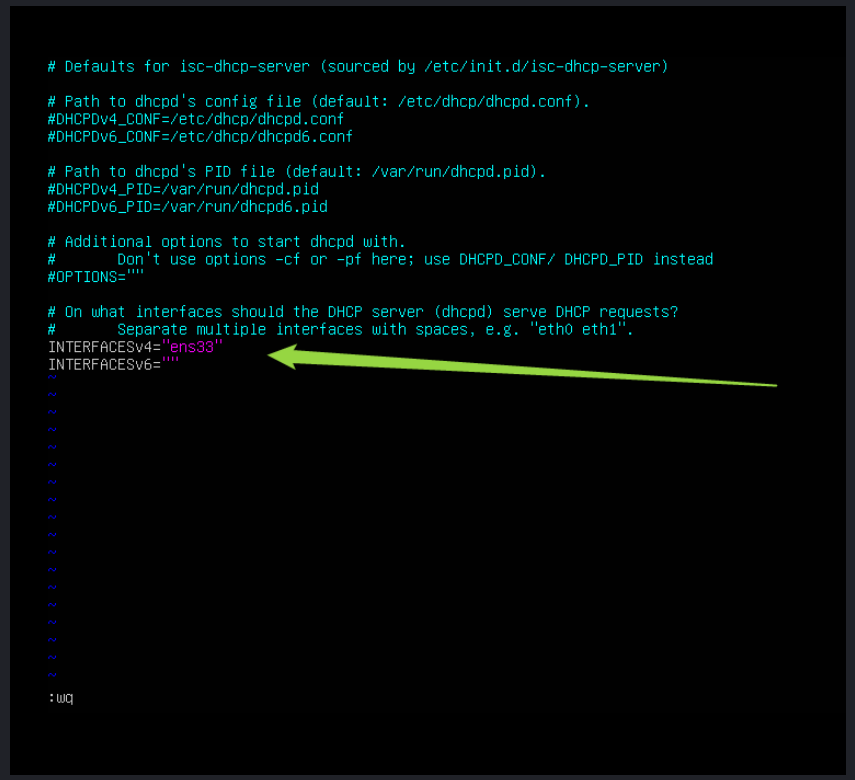
Checking Infterface Name For DHCP

```
ip a
```



Adding Infterface Name For DHCP

```
sudo vim /etc/default/isc-dhcp-server
```



Configuring Firewall

```
omerar@dhcp:~$ sudo ufw status
Status: inactive
omerar@dhcp:~$ sudo ufw enable
Firewall is active and enabled on system startup
omerar@dhcp:~$ sudo ufw allow 67/udp
Rule added
Rule added (v6)
omerar@dhcp:~$ sudo ufw allow ssh
Skipping adding existing rule
Skipping adding existing rule (v6)
omerar@dhcp:~$ sudo ufw status
Status: active

To                         Action      From
--                         ------      ----
22/tcp                     ALLOW       Anywhere
67/udp                     ALLOW       Anywhere
22/tcp (v6)                ALLOW       Anywhere (v6)
67/udp (v6)                ALLOW       Anywhere (v6)

omerar@dhcp:~$
```

```
sudo ufw status
sudo ufw enable
sudo ufw allow 67/udp
sudo ufw allow ssh
```

Restart the DHCP Server

Now that changes to the configuration are made, we need to restart the service to enable those changes. This can be done using the systemctl command:

```
sudo systemctl restart isc-dhcp-server
```

Check the status of DHCP Services on DHCP Server

This can be done using the systemctl command:

```
sudo systemctl status isc-dhcp-server.service
```

An active status indicates that the DHCP Server has successfully picked up the configuration and is ready to hand out IP Addresses.

```
omerar@dhcp:~$ sudo systemctl restart isc-dhcp-server
omerar@dhcp:~$ sudo systemctl status isc-dhcp-server
● isc-dhcp-server.service - ISC DHCP IPv4 server
     Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor preset: enabled)
     Active: active (running) since Wed 2023-02-01 19:53:03 UTC; 12s ago
       Docs: man:dhcpd(8)
   Main PID: 3702 (dhcpd)
      Tasks: 4 (limit: 4534)
     Memory: 4.5M
        CPU: 13ms
     CGroup: /system.slice/isc-dhcp-server.service
             └─3702 dhcpd -user dhcpd -group dhcpd -f -4 -pf /run/dhcp-server/dhcpd.pid -cf /etc/dh

Feb 01 19:53:03 dhcp sh[3702]: PID file: /run/dhcp-server/dhcpd.pid
Feb 01 19:53:03 dhcp dhcpd[3702]: Wrote 0 leases to leases file.
Feb 01 19:53:03 dhcp sh[3702]: Wrote 0 leases to leases file.
Feb 01 19:53:03 dhcp dhcpd[3702]: Listening on LPF/ens33/00:0c:29:17:04:ee/192.168.100.0/24
Feb 01 19:53:03 dhcp sh[3702]: Listening on LPF/ens33/00:0c:29:17:04:ee/192.168.100.0/24
Feb 01 19:53:03 dhcp dhcpd[3702]: Sending on   LPF/ens33/00:0c:29:17:04:ee/192.168.100.0/24
Feb 01 19:53:03 dhcp sh[3702]: Sending on   LPF/ens33/00:0c:29:17:04:ee/192.168.100.0/24
Feb 01 19:53:03 dhcp dhcpd[3702]: Sending on   Socket/fallback/fallback-net
Feb 01 19:53:03 dhcp sh[3702]: Sending on   Socket/fallback/fallback-net
Feb 01 19:53:03 dhcp dhcpd[3702]: Server starting service.
lines 1-21/21 (END)
```

Check Lease List

This can be done using the Command:

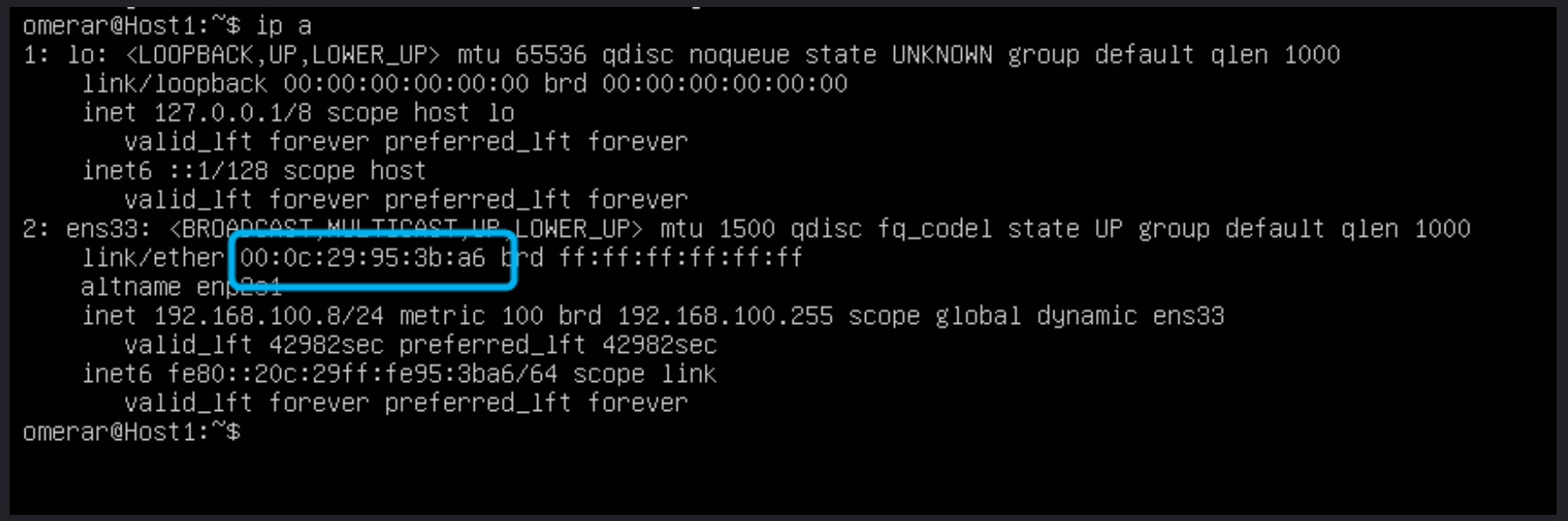
```
sudo dhcp-lease-list
```

```
omerar@dhcp:~$ dhcp-lease-list
To get manufacturer names please download http://standards.ieee.org/regauth/oui/oui.txt to /usr/loca
l/etc/oui.txt
Reading leases from /var/lib/dhcp/dhcpd.leases
MAC                IP              hostname       valid until         manufacturer
================================================================================================
omerar@dhcp:~$ dhcp-lease-list
To get manufacturer names please download http://standards.ieee.org/regauth/oui/oui.txt to /usr/loca
l/etc/oui.txt
Reading leases from /var/lib/dhcp/dhcpd.leases
MAC                IP              hostname       valid until         manufacturer
================================================================================================
00:0c:29:a7:29:6c  192.168.100.21  Host2          2023-02-01 20:13:07 -NA-
```

Check MAC address Of Host1

To Check MAC Address use this Command:

```
ip a
```



Configuring IP Reservation For Host1

```
sudo vim /etc/dhcp/dhcpd.conf
```

```
# Fixed IP addresses can also be specified for hosts.   These addresses
# should not also be listed as being available for dynamic assignment.
# Hosts for which fixed IP addresses have been specified can boot using
# BOOTP or DHCP.   Hosts for which no fixed address is specified can only
# be booted with DHCP, unless there is an address range on the subnet
# to which a BOOTP client is connected which has the dynamic-bootp flag
# set.
host Host1 {
 hardware ethernet 00:0C:29:95:3B:A6;
 fixed-address 193.168.100.22;
 }
# You can declare a class of clients and then do address allocation
```

Now that we have the MAC Address, we can put it in the configuration file:

This will reserve the IP Address 192.168.100.22 for the client with the MAC Address 00:0C:29:95:3B:A6.

Check Lease List

This can be done using the Command:

```
sudo dhcp-lease-list
```

```
omerar@dhcp:~$ dhcp-lease-list
To get manufacturer names please download http://standards.ieee.org/regauth/oui/oui.txt to /usr/loca
l/etc/oui.txt
Reading leases from /var/lib/dhcp/dhcpd.leases
MAC                IP              hostname       valid until         manufacturer
=============================================================================================
00:0c:29:95:3b:a6  192.168.100.22  Host1          2023-02-01 20:56:10 -NA-
00:0c:29:a7:29:6c  192.168.100.21  Host2          2023-02-01 20:56:01 -NA-
omerar@dhcp:~$ _
```

Troubleshooting

The DHCP Server writes its logs to the Syslog. If you find that the status of the service is inactive, you should look into /var/log/syslog file. From there on you can search for the specific problem mentioned in the Syslog on the internet.

```
sudo less /var/log/syslog
or
sudo tail -f /var/log/syslog
// for real time update on the log file
```

Conclusion

In this article, we learned about DHCP and how to install a DHCP server on an Ubuntu machine. Having a DHCP Server automates the assignment of IP Addresses which is much better than the manual configuration of each client.